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Abstract

THE SAFETY OF U.K. GAS COOLED REACTORS - A REVIEW

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During the period 1954 - 1964 development of the gas cooled graphite moderated reactor has been advanced in the U.K. to the stage where electricity generation is practical, with economic and safety standards comparable with other non-nuclear systems.

This paper outlines the progressive development of the design of the U.K. nuclear stations, and its effect on their safety. At the beginning of the decade only the Harwell and Windscale single-pass air cooled piles were operating, but by the time of the 1958 Geneva Conference several closed circuit CO_2 cooled reactors were in operation at Calder Hall, with magnox clad uranium metal fuel.

The valuable design and operating experience from them, and the many civil nuclear power stations since constructed, has been fed into the logical development of the Advanced Gas-Cooled Reactor, with stainless steel clad uranium oxide fuel. The Windscale experimental A.G.R. has operated at power for more than a year and the first large civil station of this type is being designed. From the design and operating experience which has accumulated, worthwhile site relaxations could now be allowed for new nuclear stations in the U.K.

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For each station to date extensive safety studies have been done, including fault analyses of the kind outlined in this paper. There has been close co-operation between the Consortia, the Electricity Boards, the Licensing Authorities and the U.K.A.E.A. to analyse and understand the general and special safety features of each station and tc summarise the results of this analysis in the safety reports for individual stations. This study of safety problems, from the time of initial site selection to the time of full power operation, will continue for each new station on a scale which its individual features demand.

There have been many improvements made in the designs, in the understanding of the equipment required for emergencies and in operating methods, as a result of safety analysis, and this paper gives an account of typical examples.

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